

supported in the specification on pages 3-4. Applicants have amended claims 3 and 16 to address this rejection by the Examiner. Reconsideration of these rejections is respectfully requested in view of the above amendment.

35 U.S.C. § 103(a) Rejections:

I. *Claims 1-2, 4-15, and 17-20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,015,628 to Urata et al. (hereinafter "the Urata patent") in view of U.S. Patent No. 5,736,255 to Sasaki et al. (hereinafter "the Sasaki patent").*

Amended independent claim 1 discloses a paint composition for the formation of a corrosion and moisture-resistant paint layer on a surface of a metal sheet. The composition includes a base resin and dispersed therein particles of a corrosion inhibitor prepared from porous silica particles to which Ca ions are bonded by ion-exchange, a polyphosphate, and optionally other pigment(s). Amended independent claim 8 discloses a painted metal sheet having a paint layer. The paint layer includes a base resin and dispersed therein particles of a corrosion inhibitor prepared from porous silica particles to which Ca ion is bonded by ion-exchange, a polyphosphate, and optionally other pigment(s) formed on a surface of a base metal sheet.

The Urata patent discloses an organic composite coated steel sheet. A zinc plated steel sheet has on its surface a first chromate layer and a second layer of an organic film comprising an epoxy resin mixture of a lubricant and a rust preventive additive. The amount of the rust preventive additive to be added to the organic film is from 3-50% by weight and can include fine powders and colloids of silica, sparingly soluble chromates, aluminum dihydrogen triphosphate, aluminum phosphomolybdate, etc.

The Sasaki patent discloses a sealing material having good resistance to attack by molten metal. The material includes a composition of 15-50 weight % colloidal silicon dioxide and 50-85 weight % aluminum metaphosphate.

The Urata and Sasaki patent combination does not teach or suggest a paint composition that includes a base resin with particles dispersed therein of a corrosion inhibitor prepared from porous silica particles to which Ca ions is bonded by ion-exchange and a polyphosphate. For example, the Urata patent, rather, teaches an organic film including rust preventative additives, such as fine powders and colloids of silica, sparingly soluble chromates, aluminum dihydrogen triphosphate, etc. (column 21, lines 34-38) and optionally utilizing silica ion-exchanged with calcium, zinc, cobalt, lead, etc. to further improve the steel's corrosion-inhibiting activity (column 22, lines 25-34). Additionally, the Urata patent does not teach particles dispersed in the base resin of the paint composition, in particular, Ca-bonded silica particles as in amended independent claims 1 or 8. Thus, the Urata and Sasaki patent combination fails to teach or suggest a composition of a base resin having dispersed therein porous silica particles to which Ca ion is bonded by ion-exchange and polyphosphate as claimed in amended independent claims 1 and 8 of the present invention.

Moreover, the present claimed invention shows unexpected results in corrosion resistance with the combination of Ca-bonded silica particles and polyphosphate in the base resin of the paint composition. In the present claimed invention, corrosion resistance is achieved by the co-presence of Ca-bonded silica particles with polyphosphate, and is not achieved with the use of other silica, such as colloidal, fumed or wet silica, as evidenced by the examples in the specification of the application. Furthermore, it is the combination of the Ca-bonded silica particles and the polyphosphate that provides the unexpected results. When Ca-bonded silica particles are only added as a corrosion inhibitor to the paint composition, water absorbed in a paint film violently attack the Ca and accelerate dissolution of the Ca from the corrosion inhibitor. The presence of polyphosphate controls the dissolution of Ca since polyphosphate forms chelating bonds with silica particles and forms a moderate coating on the surface of silica particles. Polyphosphate also has pH-buffering action to weaken acidification caused by

corrosive ions. Thus, the co-presence of Ca-bonded silica (porous silica particles to which Ca ion is bonded by ion-exchange) and polyphosphate in the present claimed invention provide unexpected improvement in corrosion resistance over a long term (page 3, line 15 through page 4, line 2).

Additionally, the Urata patent teaches away from the use of aluminum dihydrogen triphosphate as well as ion exchanged silica as rust preventive additives. Column 21, lines 38-40 of the Urata patent discloses the most preferred rust preventative additive as silica and sparingly soluble chromates because of their corrosion-preventing property rather than aluminum dihydrogen triphosphate. The present invention clearly teaches the combination of Ca-bonded silica particles and polyphosphate. Moreover, the Urata patent prefers to use chromium as a rust preventative additive in addition to the chromate layer to provide corrosion resistance. The present claimed invention provides corrosion resistance without the use of chromium. Additionally, the Urata patent prefers to use colloids of silica as an additive. The present claimed invention utilizing the combination of Ca-bonded silica particles and polyphosphate cannot achieve corrosion resistance with colloidal silica as supported by the data in the specification. Therefore, the Urata patent does not teach or suggest the combination of Ca-bonded silica particles and polyphosphate in a base resin of a paint composition as claimed in amended independent claims 1 or 8.

Applicants respectfully disagree with the Examiner's assertion that it would have been obvious to use the ion-exchanged silica and the aluminum dihydrogen triphosphate disclosed in the Urata patent with the Sasaki patent teaching the combination of the silica and aluminum phosphate. The Sasaki patent is non-analogous art because it is directed to sealing material, in particular, for the application on components used in hot-dip zinc plating lines. Additionally, the combination of the Urata patent and the Sasaki patent do not disclose a paint

composition that provides corrosion resistance as in the present claimed invention. There would be no reason to combine the teachings of the Sasaki patent with the Urata patent.

Additionally, the combination of the Urata and Saskai patents teach away from the use of Ca-bonded silica particles. The Sasaki patent teaches the combination of colloidal silicon dioxide with aluminum polyphosphate and not that of Ca-bonded silica particles and polyphosphate in amended independent claims 1 and 8 of the present invention. The paint composition of the present claimed invention obtains corrosion resistance with the use of Ca-bonded silica particles with a polyphosphate which cannot be achieved by the use of other silica, in particular, colloidal, fumed or wet silica, as evidenced in the comparative examples illustrated in the specification. Therefore, the combination of the Urata and Sasaki patents fail to teach or suggest a paint composition as claimed in amended independent claims 1 and 8.

Claims 2, 4-7 depend from amended independent claim 1 and add further limitations to amended independent claim 1, and are deemed to be patentable for the reasons discussed hereinabove in connection with amended independent claim 1. Claims 9-10, 15, and 17-20 depend from amended independent claim 8 and add further limitations to amended independent claim 8, and are deemed to be patentable for the reasons discussed hereinabove in connection with amended independent claim 8. Reconsideration of the rejections of claims 1, 2, 4-10, 15, 17-20 is respectfully requested.

II. Claims 11-13 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the Urata patent in view of the Sasaki patent and U.S. Patent No. 6,180,177 to Nagashima et al. (hereinafter "the Nagashima patent").

The Urata and Sasaki patents were discussed hereinabove in detail. The Nagashima patent discloses a surface-treatment agent. The composition includes a cationic component, at least one acid component, a silane coupling-agent component, and one or more water-soluble polymer components. The acid component is selected from the group consisting

of (1) fluoro-acid which contains four or more fluorine atoms and one or more elements selected from the group consisting of titanium, zirconium, silicon, hafnium, aluminum and boron; and (2) acetic acid.

The Nagashima patent, however, does not overcome the deficiencies of the Urata patent and the Sasaki patent combination, as discussed hereinabove. The Nagashima patent fails to teach or suggest a paint composition including a base resin with particles dispersed therein of Ca-bonded silica particles, as well as the combination of Ca-bonded silica particles and polyphosphate to prevent corrosion. Therefore, since claims 12-13 depend from claim 11, and claim 11 depends from amended independent claim 8, they are allowable for the same reasons as amended independent claim 8.

III. Claim 14 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over the Urata patent in view of the Sasaki patent and U.S. Patent No. 5,623,003 to Tanaka (hereinafter "the Tanaka patent").

The Urata and Sasaki patents were discussed hereinabove in detail. The Tanaka patent discloses a coating composition having corrosion resistance. The coating composition includes a resin composition of a polyester resin and an epoxy-modified polyester resin, a novolac-based epoxy-resin, a curing agent, and an anti-corrosion pigment, such as aluminum dihydrogen tripolyphosphate.

The Tanaka patent, however, does not overcome the deficiencies of the Urata patent and the Sasaki patent combinations, as discussed hereinabove. The Tanaka patent fails to teach or suggest a paint composition including a base resin with particles dispersed therein of Ca-bonded silica particles, as well as the combination of Ca-bonded silica particles, and polyphosphate. Therefore, since claim 14 depends from amended independent claim 8, it is allowable for the same reasons as amended independent claim 8. Furthermore, even if the cited

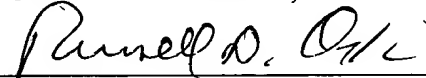
combination fairly taught the Applicants' claimed invention, the rejection is improper because there is no basis for combining the patents.

CONCLUSION

For all of the foregoing reasons, Applicants believe that claims 1-20, as amended, are in condition for allowance. Reconsideration of the rejections and allowance of claims 1-20 are respectfully requested.

Respectfully submitted,

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The marked-up versions of amended claims 1, 3, 8, and 16 are as follows:

1. (Once Amended) Paint composition for formation of corrosion and moisture-resistant paint layer on a surface of a metal sheet, which comprises a base resin[,] and dispersed therein particles of a corrosion inhibitor prepared from porous silica particles to which Ca ion is bonded by ion-exchange, a polyphosphate and optionally other pigment(s).

3. (Once Amended) The paint composition defined in Claim 1, wherein the corrosion inhibitor is porous silica particles to which Ca ion is bonded at a ratio of 3-40 weight %.

8. (Once Amended) A painted metal sheet having a paint layer, which comprises a base resin[,] and dispersed therein particles of a corrosion inhibitor prepared from porous silica particles to which Ca ion is bonded by ion-exchange, a polyphosphate and optionally other pigment(s), formed on a surface of a base metal sheet.

16. (Once Amended) The painted metal sheet defined in Claim 8, wherein the corrosion inhibitor is porous silica particles, to which Ca ion is bonded at a ratio of 3-40 weight %.